

# IMPROVED SPREAD OF STRAW DURING COMBINING

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Combines do not adequately spread the straw while harvesting cereal crops. This makes straw management difficult, especially where windrowers cut a swath much wider than the spread width of the combines' spreaders or choppers. Concentrations of straw plug tillage equipment, cause uneven soil fertility, and create seeding problems where zero or reduced tillage is being attempted.

The University of Saskatchewan provided an opportunity to find a solution, by submitting a proposal to Agriculture Canada's research contracts program in mechanization (DREAM). Under contract, the Agricultural Engineering Department of the University developed a simple modification which greatly increases the spreading capability of combine straw choppers.

You can make the modification yourself, or have it made by a local shop. This publication shows how.

Most straw choppers spread from 3 to 5 metres. However, you can just about double the spreading width of many combine choppers by changing the size and shape of the straw deflectors. The actual increase depends on the original design of the chopper.

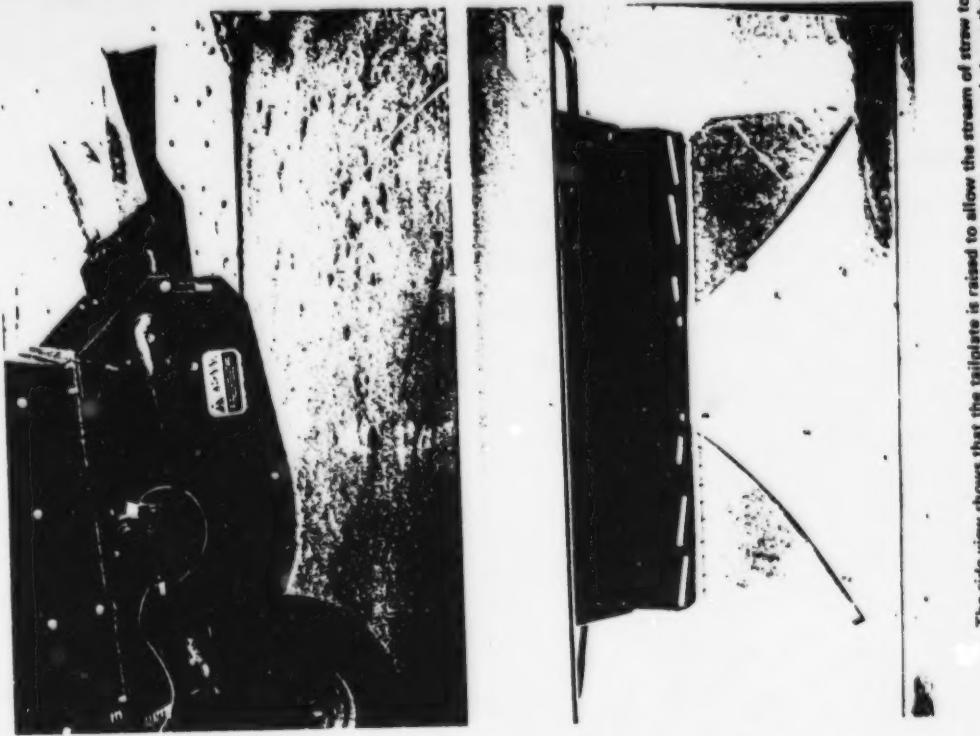
To get the best effectiveness, locate the modified deflectors so the stream of chopped straw leaving the chopper rotor hits them directly. Direct the stream slightly upwards to gain the greatest increase in spread width. On most straw choppers direction of the discharge is determined by the position in which the chopper is mounted on the combine.

The most effective modifications were those where the original straw deflectors were removed and replaced with either two large deflectors or with two large and two smaller deflectors. Combines with choppers over 1 metre wide performed best with the two sets.

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wide and is equipped with two large straw deflectors. The chopper in Figures 3 and 4 is about 1422 mm wide and has two sets of straw deflectors; large ones in the center and shorter ones near the outside edges.

The photographs and illustrations outline the modifications. When correctly built and installed, they will greatly increase the width of spreading. Figures 1 to 4 show two choppers of different widths equipped with modified deflectors. The straw chopper in Figures 1 and 2 is about 970 mm



The side view shows that the tailplate is raised to allow the stream of straw to be directed upward for maximum spreading. The top view (on the bottom) shows the deflector position and the extension of the tailplate to hold the straw on the deflectors.

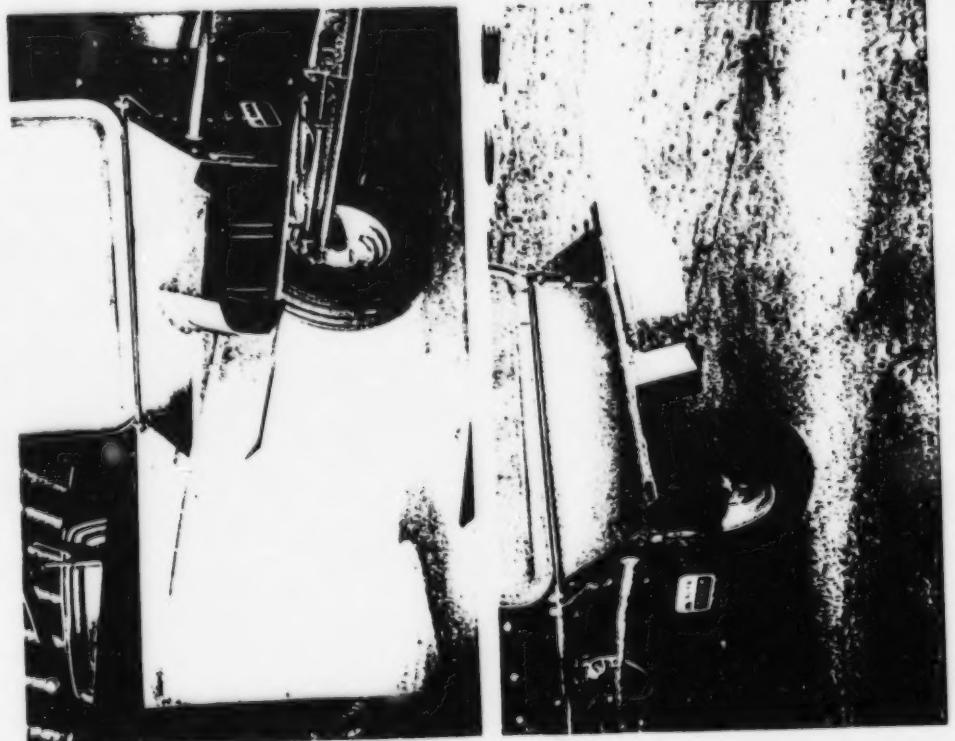


FIGURE 1 - A rear view of the modified straw deflectors on a 970 mm wide chopper. The shape shown in the lower picture determines the straw distribution pattern. Curved angle iron bolted to the tailplate supports the deflectors. Do not mount the front vee of the deflectors too close to the chopper exit. Leave at least 80 to 100 mm of clearance or the chopper may plug up.

### Deflectors

from falling directly behind the combine. This is desirable if the chaff from the sieves is not spread.

The vertical dimension of the deflector will depend on the chopper; some choppers have deeper exits than others. You can determine the proper



Figure 2: A rear view of two sets of deflectors mounted on a 1422 mm wide chopper. The two outside deflectors are shorter in length and not as deep. The outer ones prevent the straw from leaving the chopper in two streams, which could result in poor spreading. The shape of the deflectors also determines the straw spread pattern.

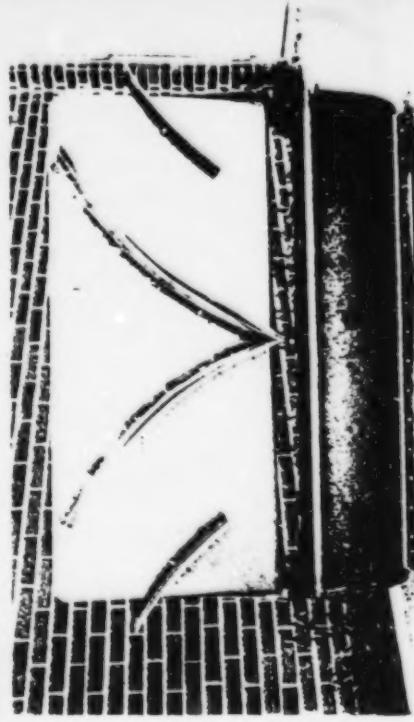
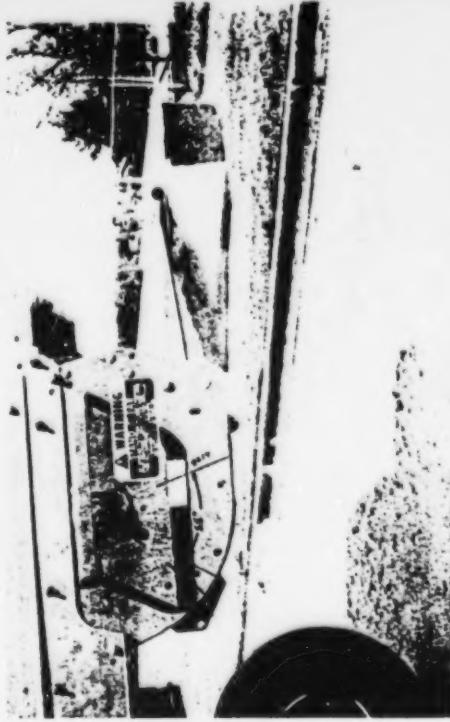


Figure 3: The side view (top) shows the tailplate extension necessary to support the modified deflectors. The lower picture is a view with the chopper removed to show the arrangement of the deflectors on the tailplate. There must be clearance of 80 to 100 mm between the front of the vee and the chopper exit in order to avoid plugging of the chopper.

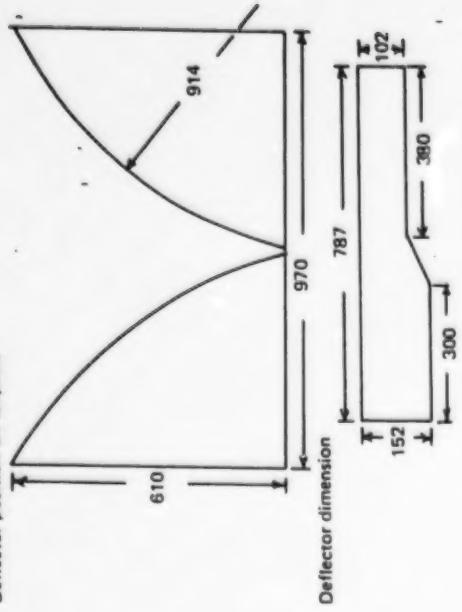
dimension by observing the direction of the exit stream of straw. The deflector should extend down far enough to intercept the stream. The dimension can be different along the deflector's length; this changes the distribution pattern over the spread width.

**Length and curvature** Make the large deflectors about 762 mm long since this will mount on a 610 mm long tailplate. The short outer deflectors used on wide choppers should be about 406 mm long. Curvature is needed to change the direction of the stream but the amount is not critical, provided the stream leaves the combine at about 45° to the side.

**Material** Construct the new deflectors of 18-gauge sheet steel, preferably galvanized, as this offers least resistance to the flow of straw. Ensure they are supported and attached to the tailplate without having bolt heads interfere with the straw as it slides along the deflectors.

This illustration shows the positions of the deflector vanes on the tailplate of a 970 mm wide chopper. The outer deflector is 1422 mm long and has a 914 mm radius. The inner deflector is 787 mm long and has a 300 mm radius. The outer vane is 102 mm wide and the inner vane is 152 mm wide. The tailplate is 970 mm long and has a 610 mm radius.

Deflector position on tailplate



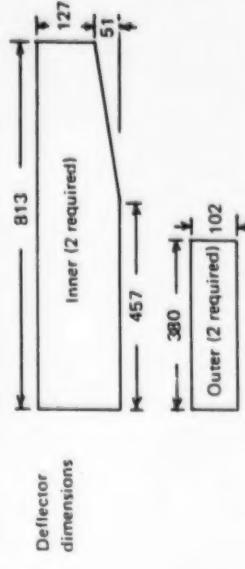
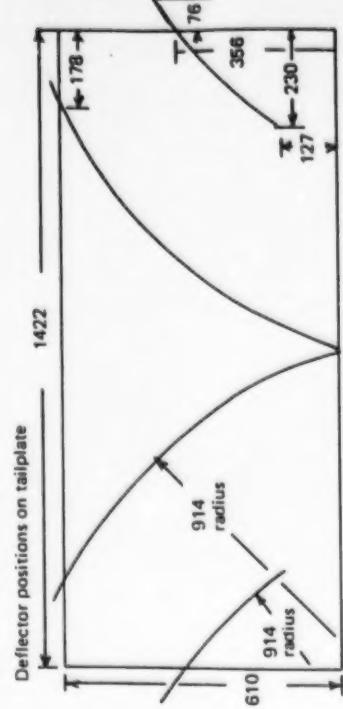
The tailplate is the flat plate upon which the straw deflectors are mounted. You should extend this part to approximately 610 mm long to support the modified deflectors, and make it of material no lighter than 18-gauge sheet metal. The tailplate also serves to keep the chopped straw on the deflectors for maximum spreading.

Suggested installations of the deflector vanes on the tailplate are shown in Figures 5 and 6 with dimensions given for the 970 and 1422 mm wide choppers. The curvature should not be too abrupt and the stream of chopped straw leaving the outer end of the deflector should be approximately 45° to the travel direction.

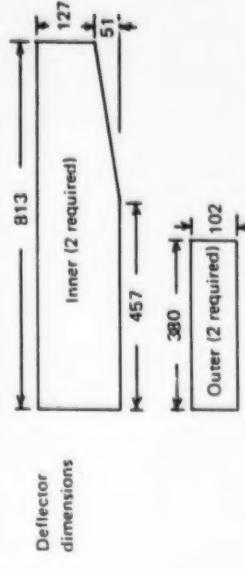
**Direction of the stream of chopped straw** The direction of the stream of straw leaving the chopper is important (Figures 7, 8 and 9). If, due to the mounting and construction of the chopper, the stream is directed downward, the modified deflectors do very little good. Also, moving the tailplate to point upward doesn't help if the stream is not directed upward. Figure 9 shows what may happen.

On most choppers the stream direction is fixed by the position of the chopper. However, you may be able to change the position by changing the chopper mounts. Carefully examine the mounts, the length required for the drive belt and the top straw entrance to the rotor before deciding how the position can be changed. Direct the stream of straw upward only

Deflector positions on tailplate



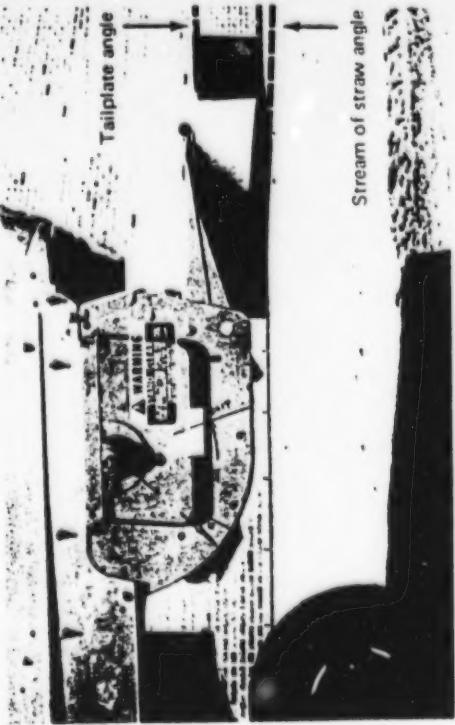
Deflector dimensions (in millimetres) and arrangement on tailplate of a 970 mm wide chopper.



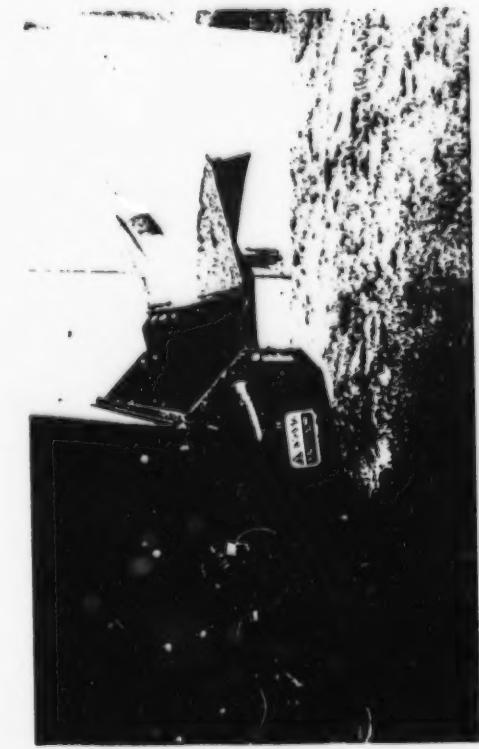
Deflector dimensions (in millimetres) and arrangement on tailplate of a 1422 mm wide chopper.

- about  $10^\circ$ ; never exceed  $15^\circ$ . A wind from one side will affect too high a stream and reduce the spreading on that side of the combine.
- Height of chopper** The higher the straw chopper is mounted, the wider the straw will be spread. While it may be possible to raise the chopper on your combine, the alterations may be quite extensive and instructions cannot be included here. If you do raise it, take care you do not interrupt feeding of the straw from the walkers.

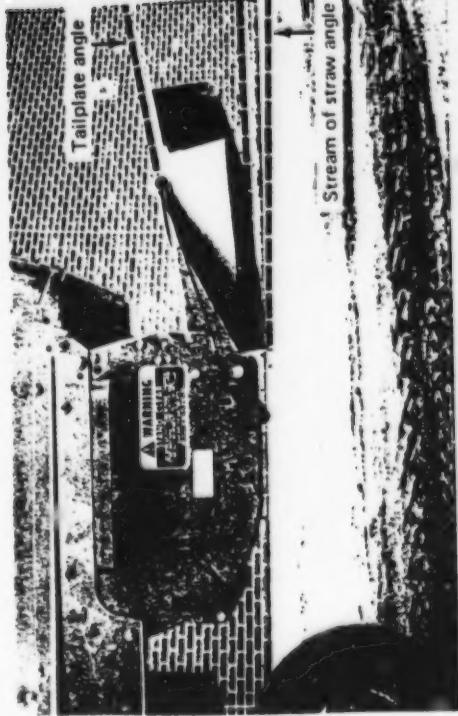
It is not possible to provide exact details to modify every make and model of straw chopper. You can expect varying degrees of improvement depending on the design of the chopper and the configuration and extent of the modifications. Rotor speed should be kept at the recommended r.p.m. Also, worn hammers reduce the spreading width. Careful observation and experimentation with deflector shape and position should let you get much greater spreading widths. To obtain spreading widths of 9 to 12 m, most choppers need even more extensive modification, and you might also have to modify the combine. Research is being done on this, and results will be published when available.



**Figure 2** - The stream of straw will pass under the tailplate defectors and be directed sideways. Increase the spread width. If possible, the outer lower edge of the large center deflector is sloped or cut off. This shape determines distribution pattern of the spread straw. By experimenting you can get the desired pattern.



**Figure 4** - A top view of a 970 mm wide straw chopper showing a pair of the modified straw deflectors. The tailplate is extended to keep the straw on the deflector so that it is directed sideways.



**Figure 3** - The stream of straw will hit the deflectors and be directed sideways, increasing the spread width. If possible, the outer lower edge of the large center deflector is sloped or cut off. This shape determines distribution pattern of the spread straw. By experimenting you can get the desired pattern.